

Analogue of Chern-Simons invariant in non-metricity gravity and axion cosmology

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This talk is mainly based on the paper 2504.09218, a joint study with Sergei D. Odintsov.

We consider a pseudo-scalar quantity analogous to the Chern-Simons invariant within the framework of non-metric gravity.

By taking into account the coupling between this pseudoscalar and the axion, we present a scenario that may solve the axion misalignment problem, the S8 problem, and issues concerning the onset of inflation. When a phase transition occurs due to the spontaneous breaking of gauge symmetries in electroweak theories or Grand Unified Theories (GUTs), the pseudo-scalar quantity takes on a non-trivial value, which induces an axion field misalignment and leads to the creation of axion particles. If the gradient of the potential is small enough, the S8 problem may also be solved. Furthermore, we propose a mechanism whereby inflation is induced by the misalignment of the axion field generated by the phase transition in the GUTs.

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